

## 2017 Unit 1 Exam Answer Key

MC questions had a 3-point value each. Some question incorrect choices were awarded some points based on their “trickiness” while other question incorrect choices were awarded no points because it was a major target for you to have learned or the choice was not logical. This will not be the case on your AP exam, but I’m not that mean in class 😊

See me to discuss any questions about your personal responses and points awarded/deducted.

1. C
2. A
3. A
4. C
5. A
6. C
7. A
8. C
9. B
10. A

**FRQ 1**

1. The table below compares several features among a prokaryote & a eukaryote organism that are both photosynthetic.

	Prokaryote	Eukaryote
First phase in metabolism of glucose	Glycolysis	Glycolysis
Location of enzymes for photosynthesis	Plasma membrane & cell cytoplasm	Chloroplast membranes & fluids
Location of photosynthetic genes	Cytoplasm on circular chromosome	Chloroplast on circular chromosome
Location of membrane protein genes	Cytoplasm on circular chromosome	Nucleus on numerous linear chromosomes
Membrane Structure	Double-membrane	Single-plasma membrane; double organelle membranes

- a. Explain how ONE feature in the table above provides evidence for the leading theory about the conditions on early Earth.

**ALL LIFE USES GLYCOLYSIS WHICH DOESN'T REQUIRE OXYGEN; EARLY EARTH DIDN'T HAVE OXYGEN.**

- b. Explain how THREE features in the table above provide evidence for the leading theory about the evolution of eukaryotes from prokaryotes.

**Circular chromosomes in prokaryotes & eukaryote organelles show organelles were likely once prokaryotes engulfed by other prokaryote cells.**

**Double membrane in prokaryotes & eukaryote organelles shows organelles were likely once prokaryotes engulfed by other prokaryote cells.**

**Photosynthetic enzyme locations support engulfment theory.**

**Others acceptable if explained similarly.**

**FRQ 2**

2. Two populations of a parrot species were observed over the course of 10 years. The populations live on the same island within the same geographic range. The island is over 2,000 miles from the nearest mainland. Two varieties of colors were observed, a dominant red phenotype and a recessive blue phenotype. During the 10 year period there was no significant effect of color on survivorship. Several other pieces of data are documented in the table below.

	1990		2000	
	Population A	Population B	Population A	Population B
Red Phenotype	30%	30%	5%	31%
Blue Phenotype	70%	70%	95%	69%
Hybrid offspring viability of A x B crosses	98% hybrid offspring viability		12% hybrid offspring viability	

- a. Calculate the percent change in the red allele from 1990 to 2000 for **population A**.

Figure out red allele frequency using hardy Weinberg:

Blue phenotype =  $q^2$  because it's the recessive trait (.70 in 1990) and (.95 in 2000)

Blue allele frequencies = sq-root of .70 = .84 in 1990 and sq-root of .95 = .97 in 2000

Use blue allele frequencies to calculate red allele frequencies

red allele frequency in 1990 = .16 and in 2000 = .03

Calculate percent change

$$\frac{[(\text{Final} - \text{Initial}) / \text{Initial}]}$$

$$[(.03 - .16) / .16] = -81\%$$

- b. For the 10 year period documented, **identify** a likely mechanism of evolution for population A and **identify** 2 mechanisms of evolution that are not likely occurring in population B.

Pop. A likely mechanism: Preferential mating, obvious trend in color selection but prompt explicitly states no selective advantage for survival (No natural selection). Other mechanisms not likely to cause the obvious directional change observed in pop. A.

Pop. B unlikely: Prompt states geographically isolated so gene flow is unlikely. Mutations not likely to shift allele frequencies significantly unless chemical exposure, etc. occurs. All other mechanisms would cause significant changes.

- c. In 2001 a tourist accidentally lost its black mambas which prey upon blue birds in their native habitat. **Contrast** the effects of the predator on each parrot population's evolution over subsequent years.

- **Population A would be greatly impacted since most birds are blue and the snakes eat blue birds only. Large drop in numbers expected and subjected to genetic drift after 2001 event.**
- **Population B would likely demonstrate evolution by survival of the fittest (natural selection) because they have greater diversity, which allows NS to operate. Blue would decrease while red increases and population remains stable and healthy.**

- d. **Propose** 2 possible mechanisms of reproductive isolation that could result in the decreased hybrid viability over the 10 year period documented.

**gametic: sperm/egg no longer compatible**

**behavioral: new mating rituals/songs develop**

**temporal: different mating times**

**habitat: live in different habitats in same geographic range**